

Course Preparation:

Day 1-5

1. Course materials for this class are found on the "K" drive. In addition there is a hard copy of this lesson plan and other course materials in the R624B Instructors notebook.
2. Make up necessary copies of the student handout and EOP student handout.
3. Make up the mini-procedures notebooks (Groups A,B&C and figures) .

Day 6-10

1. EPG/SAGs texts for the students are in the cabinet in the BWR6 simulator room. Distribute to the students. These are not to be marked up.
2. Obtain CDs of the EPG/SAGs and distribute to the students in lieu of personal copies of the text.
3. Handouts of the RPV control Guideline and contingencies are in the same file cabinet as the text when needed.
4. Locate the EOP transparency book. It should be in the bookshelf by the instructors console in the BWR classroom on the 4th floor.

DAY 1

1. Conduct Course Introduction

a. General

- 1) Complete form - Student Information Sheet
- 2) Introduce instructors & students
- 3) Student Handout Sheet
 - a) Telephone system
 - b) Messages
 - c) Area Information
 - d) Class hours - final day (Class hours - final day (12:30pm))
 - e) Lunch period

4) Security

b. Facilities

- 2) Classroom
- 3) Simulator
- 4) Coffee mess
- 5) Restrooms

- 6) Food & drink
 - a) vending machines on 2nd and 6th floors
 - b) no snacks or beverages near or on the consoles
- 7) Smoking - outside only
- c. Course Overview
 - 1) Course Objectives
 - 2) Typical Course Outline
 - 3) System Figures Handout
 - 4) Control & Protection Setpoints Sheet

IC - 20

Place the following parameters on the window displays if desired:

window 1-

APRM A (B000)

window 2-

WR reactor level A (L943)

window 3- Generator Gross
MWe (E506)

2. Review BWR Systems - OPTIONAL**3. Initialize in IC20, 100% power, EOL, Seq. B step 927 and conduct a general tour of the control room.**

- a. General maintenance - light bulbs, recorder paper, etc will be replaced by the instructors or simulator engineers only.
- b. Emergency Trip Buttons
- c. Panel locations and nomenclature, H/O.
- d. Annunciator System
- e. Explanation of indicating lights convention
 - 1) red- breaker closed or valve open
 - 2) green- breaker open or valve closed
 - 3) blue- When off indicates a motor overload or under voltage condition, but can be operated in the emergency positions.
 - 4) dimwhite - breaker tripped and can be reset at the control panel (remotely).
 - 5) bright white- breaker tripped and has to be reset at the breaker cabinet (locally).
- f. Throttle valves - Handles or trim are green
- g. Equipment that can be operated at the remote shutdown panel - yellow
- h. Visual aids
 - 1) green dots - Rx vessel level
 - 2) orange dots - Pushbuttons
 - 3) yellow dots- Bad instrument

4. Panel review:

- a. Conduct a general discussion of the basic steam cycle using the mimic on MCB-01L.
- b. Conduct a general discussion of reactor control by the CRD system and by the RFC on the 602/603 panels.
- c. Conduct a general discussion of the EHC system.
- d. Conduct a general discussion of the FWLC system.

Handout on Procedure
numbering

- e. Overview the main steam system including SRV's ,
RWCU, RCIC on the 602 panel.
- f. Overview LPCS, RHR, HPCI and Containment mimic
on the 601 panel.
- g. Overview the main condenser, SJAЕ, CAR's and
electrical distribution/Diesel Generators on MCB-01.
- h. Point out the Ventilation and RBSVS panels(VC1&2).
- i. Overview panel PNL-MXP
Water systems, inst.air system to DW, DW vacuum
breakers
- j. Overview the backpanels pointing out the following
systems/equipment:
Jet pump instrumentation
Steam leak detection
RPS
ARM's and Process Rad monitors
TIP's and NMS
Remote SD panel
Off gas pane

5. Initialize into IC8 for system startups/lineups. Overview the
current plant status:
Mainly CCW,service water, TBCLCW, RBCLCW, air,
electrical and ventilation systems are in service. Reactor
water temp. is 137°F with the head vents open.

6. Overview the procedures and their usage.

Index system

- 22.000 series - General Operating Procedures
- 23.000 series - System Operating Procedures
- 24.000 series - Operator Surveillance Procedures
- 25.001.01 - EOP Supplement Procedures
- 29.023.00 series is EOP's in written format.

The number following the 23 or
24 is the same for the respective
system.

Some annunciators have reflash
such as acc. Trouble. Some
windows indicate this but some
do not.

Review ARP's and numbering system. Note the 4 digit
no. on the window is the actual ARP no.. The other
no.(A-1 etc.) is for locating the procedure in the ARP
response book

Prior to performing the reactor startup overview the general SU procedure

Insert FAST ROD SPEED (RPF-RD12) after each person in the group has WD 2 or 3 rods. This RPF will have to be removed when begin to withdraw grp 3 rods as these are banked out.

Note: To establish the desired condensate demin flow use FCV -23 at appro. 60%.

7. Separate into groups for assigned operations and review the instructions in each section of the book.

Group A assignments:

RPS
CRD system
SRM, IRM, APRM's and RBM
RWM
RMC system
Conduct a reactor startup(sequence A) to critical and establish a 90°F/hr. heatup.

Group B assignments:

RWCU system
Recirculation system
Main Steam system
ECCS systems (ADS,LPCS,RHR)
DG's

Group C assignments:

Condensate and feedwater
Turbine Lube Oil
EHC system
Turbine High Pressure Fluid
Seal Water
Steam Seal
Condenser Air Removal

8. When all assignments are completed reset the IC and rotate.
Default snapshot IC is 00
9. At the end of the day snapshot into:
Day shift - IC28
Evening shift - IC29.

Day 2

1. Initialize into IC8 or to snapshot from previous day and continue Assignments.
2. Upon completion of assignments rotate and continue.
3. Upon completion of all rotations initialize into IC-9, 1.1% power, 356°F, 147 psia, seq. A, step 213, procedure 22.001.01 step 8.1.3.11.
 - a. Review plant status.
Seal steam is now on main steam.
 - b. Place RCIC and HPCI in standby.
 - c. Discuss other operations performed:
 - 1) HPCI and RCIC surveillances after 1 BPV opens (app 150#).
 - 2) Commence warming of a RFP, Main Turbine and Offgas.
 - 3) Pressure regulator maintained app. 75# greater until 920# is reached.
 - 4) 300# - 500# SJAE's swapped to main steam.
 - 5) 350# a RFP is placed in service in startup level mode.

Note: IC 10 has #1 BPV open app. 10%. Procedure has you pull rods to 50% BPV on #1 then following RFP operations you are to increase press set to close the valve. This will cause a pressure/power problem so leave the BPV at 10%.

4. Initialize into IC-10, 4.2% power, 431°F, 366 psia, seq. A step 297, procedure 22.001.01 step 8.1.3.18.
 - a. Review plant status.
SJAE is now on main steam.
 - b. Roll and place the "A" RFP in startup level control mode.
5. Initialize into IC-11, 3.6% power, 517°F, 842 psia, seq. A step 311.

- a. Assign students to positions as follows:

	<u>6 students</u>	<u>5 students</u>	<u>4 students</u>
SS	SS	SS	SS
STA	STA	STA	STA
RO1	P603	P603	P603\MCB01
RO2	P601\602	P601\602	P601\602
RO3	P601\602	MCB01	
RO4	MCB01		

- c. Discuss consequences of placing the mode sw. to RUN when the conditions are not met.
- b. Review plant status.
- c. Place the mode switch in RUN per SP 22.001.01 step 8.1.3.19.

Day 3

1. Initialize into IC-14, 24% power, seq. A step 457, ready to roll a hot turbine.
 - a. Rotate position assignments
 - b. Review plant status
 - c. Roll the main turbine and synchronize the generator.
- c. RWM should be AUTO
BYPASSED
2. Increase power to rated and perform the following:
 - a. Place additional condensate demins in service as necessary.
 - b. Warm the 2nd RFP
 - c. Verify the RBM activates
 - d. Place the 2nd RFP in service in auto 3E control.
 - e. Withdraw rods to 80% rod pattern then increase core flow to at least 45% of rated (35 Mlbm/hr) or increase core flow to 45% then withdraw rods to 100% pattern.
 - f. When recirc pump speed is 45% transfer RFC to master manual.
 - g. Increase power to rated.

Day 4

1. Initialize into IC-20, power 100%, seq. B step 927.
 - a. Rotate job assignments
 - b. Review plant status
3. This is a prerequisite for HPCI/RCIC operations
2. Perform the following surveillances.
 - a. RCIC full flow test - SP24.119.01.
 - b. HPCI full flow test - SP24.202.01.
3. Perform suppression pool cooling in conjunction with RCIC/HPCI operations
4. Simultaneous to performing SI's remove a RFP from service and then restore and return to 100%.

5. Rotate assignments until all have completed the evolutions.

7. Insert the following malfunctions consulting procedures and technical specifications:
 - a. Single RFP trip and restore
 - b. Single recirc pump trip and restore
 - c. LPRM upscale and bypass
 - d. APRM upscale and bypass
 - e. CRD - FCV fails closed
 - f. CRD pump trip
 - g. RPS trip
 - h. Other malfunctions to support Tech Spec and the static exam.
8. Discuss Hatch procedure for on line maintenance and use the matrix. Inform students of the GEM and its intended use.

Day 5

Plant Shutdown to cold with B RHR in shutdown cooling.

2. The rod sequence was B in IC20 and now its A.

1. Initialize into IC-20 and reduce power with recirc and rods to area of instability. After an appreciation for the situation is realized then discuss the steps to be taken to get you to 20% power and procedure **22.005.01, Shutdown from 20% power.**

2. Initialize into IC-32,
13.6% power with core
flow at 40% and recirc at
30% speed. Seq. A at step
346 (RWM grp 20).
Reinitialize the RWM

Have the students
determine the status of the plant.

Power / flow /
feedwater / NMS /Mwe /
Annunciators

Review 22.005.01 from
the beginning to step
8.1.5 . and have the
students commence
operations at this
step. Discontinue rod
insertions when step 303
is completed.

NOTE:

Step 8.1.8.1- to test
the emerg. bearing oil pump use
the test
pushbutton on the upper left
section of the apron.

Step 8.1.8.4 - no
speed select

Step 8.1.15 - TGOP
already running

Step 8.1.17 - already
done

step 8.1.18 - cannot
do

step 8.1.19 - cannot
do

step 8.1.21 - on panel
602- nuclear boiler process

area

step 8.1.23 - stop insertion after step 303 is completed
step 8.1.25 - do not do at this time.

step 8.1.27 - Allow cooldown to cause a reactor
restart . This will occur at approximately 600#.
Allow restart and freeze simulator when scram on
IRMs. Instructor perform scram follow up and reset
and when conditions stable give control back to
students.

Note: The procedure does not state which level instrument this is read on. Should be on the 0-400" rg.

4V-0006 and 0014 opened. These are found on RF page RHR1. Do not have remotes for step 8.1.5.8.

Return to **22.005.01, Shutdown from 20 % power** and continue.

step 8.1.33 - RWCU orifice bypass valve thermal overloads is RF page CUR1

step 8.1.35 - head spray not necessary.

step 8.1.35.1 - Thermal overloads for head vent MOV 83 is remote function page for reactor recirc RRR1

Step 8.1.36 - Freeze when reactor water temp is approx. 180.

step 8.1.30 - Mechanical vacuum pumps will not have to be started as vac. stays above 25".

step 8.1.32.2 - Freeze the sim and go to procedure **23.121.01, RHR system.**

Review section 4 (Precautions) and section 6.0 (Limitations) and section 8.1.5 to 8.1.5.1.

Have students commence operations at step 8.1.5.1.

In step 8.1.5.4 the sample results **do not require a flush.**

Note: in SP 23.121.01 (RHR) step 8.1.5.7 has fill valves

Review plant status and discuss concern for thermal binding on reactor recirc loop B discharge valve that was closed. Recirc procedure mentions this.

Note that in the **Return to standby of SD cooling** it was mentioned about thermal binding of the 47 or 48 valves.

Note that in the SD cooling procedure sec. 8.1.5.13 it is also stated it is not desired to run the other reactor recirc pump and in sec. 8.1.5 should have at least 43" of water level and if not, both loops of RHR should be running.

Also discuss other ways of losing reactor water.

RHR min flow valve

RHR pump suction valves

RHR 47 and 48 valve operations

Perform Shutdown Cooling Exam first thing next morning. This should be Monday AM.

DAY 6**Simulator**

1. Perform the SD Cooling Exam.
2. If not previously done perform HPCI, RCIC, Supp. Pool Cooling and taking off and putting on a RFP.
3. Review the scram procedure covering the following:
 - How to verify all rods FI and power decrease.
 - CRD system status in scram mode
 - Scram reset
 - Insertion of NI's
 - Reset of setpoint set down
 - Level and pressure control

Reset and repeat scrams as desired by instructor or students.

4. Scram the plant using ARI div 1 or 2 and reset the scram.
Scram the plant using ARI both div 1 and 2 and reset the scram. Note the shorter time to depressurize the air header is due to more ARI valves being open.

Classroom

EOP Introduction
Overview of the RPV Control guideline and it's contingencies.

Simulator

1. Handout copy of the RPV Control Guideline and review RC/Q, RC/L and RC/P using the EOP board.

Note: This instructor guide contains a recommended outline to follow while teaching the R621B EOP course. It is intended to be used as a guide only and the scenarios contained in it are recommendations not requirements. The instructor may vary the outline and scenarios as necessary to accomplish the objectives of the course.

General Instructions:

1. All Scenerios will begin with IC20 unless otherwise specified.

2. Transients may be discussed prior to being conducted. The discussion should include indications, systems, and parameters to monitor. Use of the flow charts is desirable during the discussions to indicate a probable course of action.

3. Freeze the simulator at various points to allow discussion of actions / occurrences up to this point and field questions.

4. All transients should be discussed after being performed on the simulator. This discussion should identify problem areas or weak spots in the execution of the procedures.

5. Work closely with the students on the boards and on the procedures.

6. Rotate assignments following each scenerio unless otherwise desired.

Suggested assignments with rotation upward(SRO becomes the helper):

SRO
STA
603
601/602
MCB01
Helper 1
Helper 2

A partial list of malfunctions is attached as Appendix 1.

Peform the following RC/L and RC/P exercises:

1. Loss of 1 RFP followed by the 2nd. Allow RFP's to be restored.

Remote 1- FW01C

T-1

Remote 1-

FW01A

T-2

Remote 2 -

FW01B

Inform students/operators that it would be desirable to initiate RCIC and HPCI early to prevent reaching L2 due to all the actions it carries with it.

Allow students to restore RWCU, Reactor recirc. And normal pressure and level control then establish a controlled cooldown after you have established forced circulation.

HP02 brings in an annunciator on the lube oil reservoir.

2. Loss of both cond. Boosters and failure of HPCI to auto start. This allows manual start of HPCI and level recovery before reaching L2 if RCIC and HPCI are initiated when it is realized level will reach L2.

T-1

Remote 1- HP01
- FW10C

3. Loss of 2 RFP's without allowing them to be restored.

Following level recovery with RCIC and HPCI, discuss the consideration of depressurizing to boosters to get off of RCIC.

T-1

Fail all BPV's to open, isolate HPCI & fail RCIC to auto start. Trip the main turbine and the RFP's. If students manually initiate RCIC then Trip it as soon as flow is established.

Level will be controlled by CRD's and boosters with SRV's used to depressurize to the boosters. Discuss augment pressure control per RC/P.

4. Loss of 2 RFP's and HPCI.

Observe slow level recovery with RCIC and CRD in scram mode. Depressurize to the the boosters and observe level response. Discuss ins and outs of depressurizing to the boosters to minimize time below L2 and how this will effect the level trend. Some plants may lose DW cooling and instrument air/nitrogen at L2 which may effect DW pressure and SRV's and MSIV's. Here these isolate at L1.

During or following the exercise discuss the sources of steam production and makeup capability of RCIC and CRD.

T-0
HP02
T-1
Remote 1-FW01C

T-0
TC06E
RC02
T-1
HP04
T-2
Remote 1- FW01C
- TC12
T-3
Remote 2- RC05

2. Perform the following exercise to emphasize the goal of using the normal level and pressure control systems.

Full MSIV closure and then equalize around and restore level and pressure control with normal systems.

T1
Remote 1- MS10 in for 10 seconds

DAY 7

Simulator

1. Perform the following RC/L and RC/P exercise:

SLC is also available, if necessary.

Discuss what action would have been taken if it had been necessary to exceed 100°F/hr.

T-0

RD06B

T-1

Remote 1- RD06A

T-2

Remote 2- MS04 at 60%

- HP04

- RC05

4. Perform the following RC/L, RC/P, C1, C2 exercise.

Loss of both booster pumps, HPCI, RCIC, 2 CRD pumps, 3 LPCI pumps and both CSS systems.

Level control by use of SLC and depressurize to the one LPCI and/or the condensate pumps.

Discuss method of depressurization. BPVs at 100°F initially then greater than 100°F then SRVs when MSIVs close at L1.

Discuss if you would/could exceed 100°F when using SRVs.

Note: You may have to induce a small leak using RR21 at 1 or 2% to force C2 or lose more pumps. All dependent on how timely the operators take actions. If not timely you will probably not have to use additional malfunctions.

T-0

RD06B

CS01A pump failure

CS02B injection vlv failure

RH05A pump failure

RH10B injection vlv failure

T-1

Remote 1- RD06A

T-2

Remote 2 - RC05

T-3

Remote 3 - HP05

- FW10C

- FW01C

3. Perform the following RC/L, RC/P exercise.

Failure of HPCI, RCIC and MSIV full closure due to steam leak outside the DW and cannot reopen MSIV's.

Level control by depressurizing to the boosters with the SRV's at <100°F/hr.

5. Perform the following RC/L, RC/P and C1 exercise with stuck rods.

Note: Based on the discussion of the term Shutdown and under present conditions or under all conditions and how many rods it took to go critical during week 1, the students should deduce the reactor is shut down under all conditions. However; most will say it is not and will enter C5.

Should probably freeze and discuss this if students do not say the reactor is shutdown under all conditions.

Stick 3 control rods, Trip 2 condensate booster pumps, HPCI, 2 CRD pumps and both LPCI pumps. Fail the RCIC speed controller to only allow approximately 300# discharge pressure. RCIC will later be tripped before reactor pressure is decreased to where it would inject.

Level should be controlled by using the SLC pump and by depressurizing to either the condensate pumps or LPCI pumps. To do this one will have to exceed 100°F/hr cooldown using the BPV's. To do this one will have to declare the reactor shutdown under all conditions with anticipating emergency depressurization from C1.

Discuss how the event would have been different if LPCS was available. Discuss the choice (Quality vs disc. press) between using LPCI or condensate water (choice may have been dependent on the level trend in respect to TAF).

Discuss the actions if one had not determined the reactor was shutdown under all conditions. This would have you go to C5, still use LPCI or condensate; however would have to decide to use SLC on your own as it is not listed in C5 and because you have exited RC/Q due to being shutdown under present conditions. Also you could not have rapidly dep. with the BPV's & could not have used LPCS if available until after C2 due to injection inside the shroud.

T-0

RD100611

RD102631

RD104643

CS01B pump

CS02A inj. valve

RD06B

RC06 @ 1%

T-1

Remote 1-HP04

T-2

Remote 2-RD06A

T-3

Remote 3-FW01C
-FW10C

T-4

Remote 4- RC05

DAY 8

Classroom

Review the primary containment control guideline.
Show videos on chugging and pool swell

Simulator

1. Perform the following RC/L, RC/P, C5 exercise.

Stick at least 4 rods full out in the center of the reactor such as the reactor cannot be considered shutdown under all conditions but shutdown under present conditions. Then have a loss of both booster pumps, HPCI, RCIC, Both CRD's and 3 LPCI pumps. Should go to C5 and control level by depressurizing with the BPV's to the D LPCI pump and/or the condensate pumps. Note, cannot depressurize greater than 100°F this time. Exit of RC/Q due to shutdown under present conditions. Discuss use of SLC here as level control but not anywhere in the EOP's unless you do not exit RC/Q. Discuss when LPCS can be used in C5.

LPCS cannot be used until after emergency depressurization in C5.

T-0

RD102223

RD102227

RD102623

RD102627

RH05B pump

RH10A inj. Valve

(Div 1)

T-1

Close the A CRD pump discharge valve. Remote function Page RDR1-RD02 @ 0% (indication of a broken gear box or shaft).

T-2

Remote 1-HP03
(Discharge line break)

T-3

Remote 2- FW10C
FW01C
RC04(Auto
isolate)

Contrast this exercise to the previous exercise at the end of day Two (3 stuck rods).

2. Perform the following SP/T and RC/Q exercise.

Complete failure of RPS and a hydraulic lock on the control rods. One SRV fails open and stays open. Should try manual RPS first followed by ARI. After ARI is initiated remove the hydraulic lock malf. to allow success with resetting, draining down and scrambling again until all rods are fully inserted.

T-0

RP02

RD21

T-1

Remote 1- AD06A

T-2

Remove RD21 after

ARI is reset

T-3

Remove the fuse for the A SRV by remote function (MS05) when desired. If you want to push HCTL and initiate SLC leave the SRV open longer.

If you desire to pull the fuse to the SRV but have it stay open; then after the SRV is failed open stick it open using malf. AD07A then pull the fuse.

Note: High drywell pressure may come in before power decreases to where all SRV's are able to be closed. Drywell venting should be established per SP 23.418.01(HVAC-Rx Bldg) section 8.1.9(PCT pressure control during operating conditions 1,2 or 3)

which will send you to SP23.425.01(PC Inerting Sys.) section 8.2.6 (Drywell venting for pressure control). If DW pressure reaches 1.69# this flow path will isolate and cannot be defeated at this time. However, DW temp will also probably exceed 145°F and DW cooling trip/isolations can be defeated per the PCT control guideline and prevent this. Use procedure SP25.001.01 App. 12.5(DW cooling isolation defeat). If not, when all SRV's are closed you may want to pull the RPS fuses.

later in the exercise to point out why fuses in RPS are pulled versus de-energizing the busses. If this failure has been performed earlier then you may not want to do it again.

Fail RPS and ARI to fail completely. Fail 2 BPV's closed.

Fail both CRD pumps. Insert 3 accumulator failures at different times. Following runback and trip of the recirc pumps and plant stabilization trip the main turbine. Fail the squibs to fire on SLC. Lower level to where SRV's are closed and on the BPV's. Pull fuses on all of the A RPS and after power is stabilized from lowering of level then pull the B RPS fuses.

T-0

RP02
RP06B
TC07C&D
SL01A&B
RD06B

T-1

Remote 1- RD06A

T-2

Remote 2- RD091419

T-3

Remote 3- RD092631
- RD091427

T-4

Remote 4- TC12

T-5

Remove fuses;
RPS A- RP05A,C,E,G
RPS B- RP05B,D,F,H

DAY 9

Classroom

Review the Secondary Containment Control and Radioactive Release Control Guideline.

Simulator

1. Perform the following RC/Q, C5 and DW/P exercise.

Prior to performing the following exercise fail RPS A or B to witness the effects on the plant. This knowledge will be used

2. Perform the following RC/Q and C5 exercise.

Completely fail RPS and ARI then insert an EHC oscillation followed by EHC regulator failing high (valves fail open). MSIV's will close on <825# MSL pressure. Plant will put itself into a level power control mode at approx. 25% power (HPCI/RCIC/CRD makeup capability). SRV's will be driving pool temp. up.

Allow SLC, rod insertion and, if necessary, Level/Power control to be performed to where power is <3-5% and with suppression pool cooling in service and SP/T increase is nil, then pull RPS fuses.

T-0

RP02

RP06B

T-1

Remote 1- TC03

T-2

Remote 2- TC01A

T-3

Remote 3- RP05A,C,E,G

T-4

Remote 4- RP05B,D,F,H

3. Perform the following PC- DW/P, DW/T and SP/L and SP/Text exercise.

Small leak into the drywell resulting from vibration on the "A" recirc pump causing failure of both seals and a weld failure on a riser pipe with an added steam leak inside containment to get the desired drywell response. Will result in shutting down the plant due to leakage and or hi DW pressure scram. Will spray the supp. chamber which will require overriding the LOCA initiation signal on the 601 panel. Continue exercise to the point where you exceed 9# in the suppression chamber and need to spray the drywell.

T-1

RR06A with severity increased to alarm

T-2

Remote 2- RR09A

RR10A

T-3

Remote 3- RR21 with final severity at 100%

T-4

MS01 with severity
gradually increased as desired to
100%.

If necessary use
malfunction RR20A(Recirc loop
A rupture) at 1% to
create desired conditions.

DAY 10

Simulator

Perform the following RC/Q, C5, PC exercises:

1) Fail RPS to scram, place a hydraulic lock on the CRD
system And insert a small LOCA in the DW. This will keep
reactor pressure up with the reactor not shutdown. ARI will
function and after the reactor is shutdown by repeated

scr
a
ms
an
d/
or
ro
d
ins
ert
io
n
it
ca
n
be

depressurized. SLC may or may not be utilized.

T-0

RP02

RD21

T-1

RD21 and increase as desired

MS01 and increase as desired

2) Small break LOCA with a loss of both RFP's, RCIC, HPCI and a hydraulic lock on the scram volume. Allow scenerio to run to where level is restored to normal.

T-0

RD21

RC05

T-1

HP05

T-2

RR21 increase to 5% and/or as desired

MS01 increase to 13% and/or as desired

T-3

Trip both RFPs (FW01C) when reactor scrams.

Perform Part A of the Simulator Operating Exam before going to lunch and Part B of the exam after lunch.

Complete evaluation sheets and collect key cards.

R704B Instructor Guide

Appendix 1- Partial List of Malfunctions

Automatic Depressurization - AD

SRV leaks	AD05A-K
SRV fails open	AD06A-K
SRV sticks open	AD07A-K
All SRV's Fail closed	AD08
SRV vac.brk.fail open	AD09

Core Spray - CS

Pump trip	CS01A or B
Inj. vlv fails	CS02A or B
Full flow test fails	CS03A or B

Diesel Generators - DG

Fail to start	DG01A,B or C
Output brk fails to close	DG02A,B or C
DG trip	DG03A,B or C

Feedwater - FW

RFP trip	FW01A or B
Both RFPs trip	FW01C
CB trip	FW10A or B
Both CB trip	FW10C
C trip	FW11A or B
Both C trip	FW11C
Ind M/A fails Hi	FW05A or B
Ind M/A fails Lo	FW06A or B
RFP loss of lube oil	FW02A or B
RFP vibration	FW07A or B
Pipe rupture in TB	FW20
SF detector fails DS	FW08A-D
SF detector fails US	FW24A-D
FF detector fails DS	FW09A,B
FF detector fails US	FW25A,B

HPCI - HP

Fails to auto start	HP01
Trips	HP02

Disch line break	HP03
Steam line break	HP04
HPCI spurious trip	HP05

Main Condenser - MC

Air inleakage	MC01
SJAE steam sup block	MC04
Circ water pp trip	MC05A-D

Main Steam - MS

Seam leak inside PC	MS01
SLRupture inside PC	MS02
SLRupture outside PC	MS03
SL leakage outside PC	MS04
Seal reg. fails closed	MS06
MSIV disk separation	MS07A-H
Spurious MSIV closure (all)	MS10

Neutron Monitoring - NM

LPRM Hi	NM06XXYYZ
LPRM Lo	NM07XXYYZ
IRM HiHi	NM08A-H
IRM DS	NM09A-H
IRM inop	NM10A-H
IRM retrct failure	NM11A-H
APRM US	NM12A-F
APRM DS	NM13A-F
APRM inop	NM14A-F

Primary Containment - PC

Loss of DW cooling	PC03A or B
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SLC - SL

Squib fail to fire	SL01A or B
Pump trip	SL02A or B
Relief valve fail open @880#	SL03A or B

RCIC - RC		Seal failure, inner	RR09A or B
Loss of oil pressure	RC01	Seal failure, outer	RR10A or B
Failure to auto start	RC02		
Fail to trip	RC03	Master cont. fail Hi	RR15
Auto isolate	RC04	Master cont. fail Lo	RR16
RCIC Trip	RC05	Loop leakage	RR21
Variable speed	RC06	Loop rupture	RR20A or B
Rod Drive - RD		Main Turbine - TUO	
SM vol dr. vlv fail cl	RD02A & B	Hi vibration	TUO3A-J
SM vol vent fail cl	RD24A & B	loss of lube oil	TUO6
FCV fails closed	RD04A or B	Turbine Control - TC	
B		All BPV's fail open	TC05E
FCV fails open	RD03A or B	All BPV's fail closed	TC06E
Pump trip	RD06A or B	Ind BPV fail closed	TC06A-D
Rod drift in	Pg.RD2	Ind BPV sticks	TC07A-D
Rod drift out	Pg. RD-	EHC reg fails Hi	TC01A or B
Rod Hyd Lock	RD21	B	
Suction filter clogging	RD05	EHC reg fails Lo	TC02A or B
RHR - RH		B	
Pump trip	RH05A-D	EHC reg oscillates	TC03
Outbd Inj vlv fails(36)	RH08A or B	Turbine trip	TC12
Inb Inj vlv fails(37)	RH10A or B		
RPS - RP			
MG trip	RP01A or B		
B			
Fail to S/M complete	RP02		
Fail to S/M auto	RP03		
ARI fail complete	RP06B		
ARI fail auto	RP06A		
Spurious scram AorB	RP07A,B		
Spurious scram A&B	RP07C		
Reactor			
Fuel failure	RX01		
Reactor Recirc - RR			
Dr. Motor brk trip	RR02A or B		
Control sig fail	RR04A or B		
Hi vibration	RR06A or B		
Speed sig fail	RR08A or B		
B			